

MARITEC FUEL TESTING REPORT - PAC ATHENA

To : PACC SHIP UK LTD
 Attn To : Technical Dept
 Report No : ML1415304
 Date Of Report : 17-Jun-2014
 Vessel Name : Pac Athena
 IMO Number : 9262950
 Sample Type : LSFO 380 cSt
 Bunker Port : Singapore
 Bunker Date : 15-Jun-2014
 Supplier : Golden Island Diesel Oil Trading Pte Ltd
 Supplying Barge : Golden Energy
 Quantity : 249.8 MT
 Bottle type : Maritec HDPE
 Seal Data : Maritec A1612314 & 184205
 Seal Condition : Seal(s) Intact
 Sent From : Singapore
 Date Sent : 16-Jun-2014
 Date Received : 16-Jun-2014

B.D.N Info

B.D.N Number : 95037
 Density @ 15 Deg C : 990.4 kg/m3
 Viscosity @ 50 Deg C : 354.90 mm2/s
 Flash Point : 94 Deg C
 Sulphur : 0.947 %
 Water : 0.10 %

PROTEST NOTE ISSUED : No

RESULTS COMPARED TO ISO 8217:2005 RMG 380 TABLE-2 SPECIFICATIONS.

			Test Result	ISO Specs	
Density @ 15 Deg C	kg/m3	ISO 12185	990.1	991.0	Max
KV 50	mm2/s	ISO 3104	344.2	380.0	Max
KV 100	mm2/s	ISO 3104	32.9	35.0	Max
FlashPoint	Deg C	ISO 2719	>70	60	Min
PourPoint	Deg C	ISO 3016	<+9	30	Max
MCR	%m/m	ISO 10370	11	18	Max
Ash	%m/m	ISO 6245	0.04	0.15	Max
Water	%V/V	ISO 3733	0.2	0.5	Max
Sulphur (ISO 2005 Specs)	%m/m	ISO 8754	1.07	1.50	Max
Sulphur (MARPOL Annex VI)	%mass	ISO 8754	1.07*	1.00	Max
Vanadium	mg/kg	IP 501	36	300	Max
TSP	%m/m	ISO 10307-2	0.02	0.10	Max
AL + SI (26 + 27)	mg/kg	IP 501	53	80	Max
Zinc	mg/kg	IP 501	1	15	Max
Phosphorus	mg/kg	IP 501	1	15	Max
Calcium	mg/kg	IP 501	9	30	Max

The sample results relate only to the items tested and have been compared according to

the specifications listed in ISO 8217:2005 (E) Table-2 Specs under ISO-F RMG 380 Basis the sample received, Sulphur (MARPOL Annex VI) marked with * DID NOT MEET THE SPECIFICATION and Sulphur (MARPOL Annex VI) has exceeded the ISO 4259 interpretation limit of 1.06 %m/m for a single result.

ADDITIONAL PARAMETERS (NON-ISO)

Al	mg/kg	IP 501	26
Si	mg/kg	IP 501	27
Sodium	mg/kg	IP 501	15
Iron	mg/kg	IP 501	19
Lead	mg/kg	IP 501	<1
Magnesium	mg/kg	IP 501	1
Nickel	mg/kg	IP 501	17
Potassium	mg/kg	IP 501	15
API Gravity	-		11.3
Cleanliness By Spot			1
Net Specific Energy	MJ/kg		40.77
Gross Specific Energy	MJ/kg		43.09
CCAI (Ignition Quality)	-		852

Glossary : KV50=Kinematic Viscosity @50 Deg C;

MCR = Micro Carbon Residue; TSP = Total Sediment Potential;

(Al+Si) = Aluminum+Silicon; CCAI = Calculated Carbon Aromaticity Index

OPERATIONAL ADVICE-

Min Transfer/Storage Temp	35	Deg C
Temp at Separator Inlet	98	Deg C
Temp for injection viscosity of 10 cSt	144	Deg C
Temp for injection viscosity of 13 cSt	132	Deg C
Temp for injection viscosity of 15 cSt	127	Deg C
Temp for injection viscosity of 18 cSt	120	Deg C

DENSITY

The fuel density is near the maximum capability for operation in a conventional centrifuge. Older models of the conventional centrifuges may have difficulty to maintain the water seal in the purifier. Try to operate the centrifuges in series, e.g. purifier-clarifier. Refer to the centrifuge maker's nomogram.

Select density (test result density and not BDN density), fuel temperature at centrifuge inlet of 98 deg C and the minimum flow rate to cover the vessel's speed. With density, fuel temperature and flow rate, the gravity disc size can be selected from the nomogram.

Note that any change to density, inlet temperature or flow rate will affect the selection of gravity disc and the selection process has to be repeated. If unable to maintain the water seal with the selected gravity disc, then try with a gravity disc that is one size smaller. If still unsuccessful to maintain the water seal, then operate both centrifuges in "emergency mode" as clarifiers in parallel. Split the flow 50:50 between the two centrifuges. Shortened interval between sludge discharge is required for safety reasons in case of imbalance in the centrifuge bowl.

ALUMINIUM + SILICON

The fuel contains 53 mg/kg of catalytic fines from the refinery process. Although within ISO specifications, this level of cat fines requires extra attention. These

particles are extremely abrasive and have to be reduced by settling and proper centrifuging. Raise the temperature in the settling tank to assist in the settling effect, and drain the tank every watch.

SULPHUR

This fuel has a low sulphur content of 1.07%. If you are using a conventional 70 TBN Cylinder Lube Oil (CLO) the excess TBN additives may contribute to a build-up of deposits of calcium carbonates and calcium sulphates which tend to adhere to the piston crown, piston ring land and grooves. These deposits of calcium compounds can cause scuffing of the liners resulting in excessive liner wear. If your vessel is bunkering low sulphur fuels regularly, we would suggest that you switch from a 70 TBN CLO to a 40 TBN CLO or consult your lubricant supplier.

If operating for more than a week with this fuel of Sulphur content 1.07%; it is recommended to change to a 40/50 BN CLO as well as to reduce the CLO feed rate while closely monitoring ring and liner wear. For Man B&W engines the minimum feed rate for proper oil distribution and oil film thickness has been set to 0.5 g/bhph minimum. Check with your engine maker for appropriate CLO minimum feed rate.

The test report shall not be reproduced except in full, without the written approval of the laboratory

Please Find Compatibility Report For PAC ATHENA [ML1415304].

Thanks & Best Regards

Ms Gwee Ai Hwa / AT

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